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ABSTRACT
Listed are journal articles and dissertations related to science and mathematics education for young children (mostly pre-school through primary grades). Each entry includes a short annotation indicating the contents and the type of article. The first section on science is divided into sub-sections dealing with: general topics (including behavior studies, general approaches, and international articles); science activities; concepts and concept development; conservation (as used in learning theory); curriculum design and discussion of curriculum projects; perceptual discrimination; objectives; descriptions and evaluation of head-start programs; equipment and materials; discussion of Montessori methods; studies of perception; work based on Piagetian theory; and studies of problem solving. The second section lists discussions and studies on the teaching and learning of mathematics. The third section lists relevant bibliographies. (EB)

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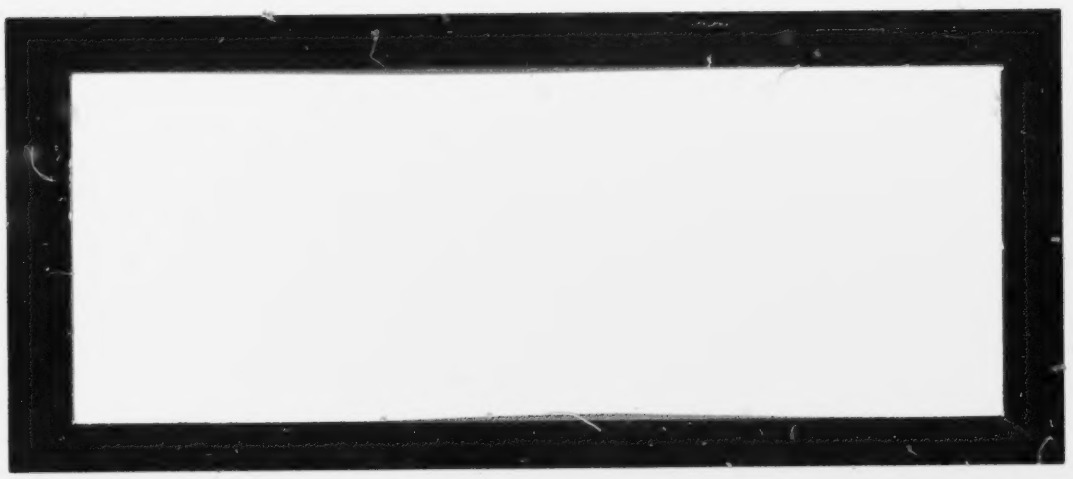

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BIBLIOGRAPHY 1

SCIENCE AND MATHEMATICS FOR YOUNG CHILDREN: AN ANNOTATED BIBLIOGRAPHY

January, 1964 - June, 1969

By Francis Case Theiss
San Jose Unified School District
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ERIC Information Analysis Center
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September, 1969

SCIENCE EDUCATION INFORMATION REPORTS

The Science Education Information Reports are being developed to disseminate information concerning documents analyzed at the ERIC Center for Science Education. The Reports include five types of publications. General Bibliographies are being issued to announce most documents processed by the Center for Science Education. These bibliographies are categorized by topics and indicate the availability of the document and the major ideas included in the document. Special Bibliographies are being developed to announce availability of documents in selected interest areas. These bibliographies will list most significant documents that have been published in the interest area. Guides to Resource Literature for Science Teachers are bibliographies that identify references for the professional growth of teachers at all levels of science and mathematics teaching. This series will include six separate publications. Occasional Papers will be issued periodically to indicate implications of research for science and mathematics teaching. Research Reviews will be issued to analyze and synthesize research related to science and mathematics education over a period of several years.

The Science Education Information Reports will be announced in the SEIAC Newsletter as they become available.

SPECIAL BIBLIOGRAPHIES - SCIENCE

Special Bibliographies are being developed to announce availability of documents in selected interest areas. These bibliographies indicate documents considered to be useful to teachers, curriculum development personnel, and research personnel. They are aimed primarily, however, at teachers and curriculum personnel.

The bibliographies are developed in areas of demand as indicated by communications received at the ERIC Center for Science Education. We invite your suggestions for areas to be included in this series.

Robert W. Howe
and
Stanley L. Helgeson
Editors

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SCIENCE AND MATHEMATICS FOR YOUNG CHILDREN
AN ANNOTATED BIBLIOGRAPHY

I. SCIENCE

A. General Topics

Achievement

McGlathery, Glenn Edward, Ph.D. An Assessment of Science Achievement of Five- and Six-Year-Old Students of Contrasting Socio-Economic Backgrounds. Dissertation: Texas University, 1967. DA 28:3897-A.

One finding: socio-economic background was not a predictor of success when non-verbal behavior was required.

Articulation

Salot, Lorraine. "Continuous Nursery-Kindergarten Education." Education 87:478-83. April, 1967.

Discusses an articulated type of nursery-kindergarten program. Many suggested activities include science experiences.

Behavior

Andrews, Martha Gilchrist, Ph.D. Peer Imitation by Three and Four Year Old Children as a Function of Three Conditions of Task Familiarity. Dissertation: Michigan State, 1965. DA 26:4802.

Task consisted of 3-step game which involved building with tinker toys, color and form matching, and choice of reward box. One implication of study: children will imitate other children of same age and sex in an experimental setting.

Helfrich, John Edward, Ed.E. A Descriptive Study of Certain Science Learnings Known by Entering Kindergarten Children. Dissertation: Wayne State University, 1963. DA 25:232A.

Data showed that children did better when stimuli of a concrete nature were presented rather than verbal stimuli by themselves.

Peterson, Rita W. and Lawrence F. Lawery. "A Study of Curiosity Factors in First Grade Children." Science Education 52:347-52. October, 1968.

Purpose of study: to design a technique for collecting, scoring and evaluating scientific aspects of curiosity as expressed behaviorally by first grade children. Bibliography.

Bereiter

Friedlander, Bernard Z. "The Bereiter-Engelmann Approach." (Essay review.) Educational Forum 32:359-62. March, 1968.

A scholarly and knowledgeable review of the first major publication from the Bereiter and Englemann preschool project for disadvantaged children. Publication reviewed: Bereiter, Carl and Siegfried Engelmann. Teaching Disadvantaged Children in the Preschool. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1966.

Moskovitz, Sarah Traister. "Some Assumptions Underlying the Bereiter Approach." Young Children 24:24-32. October, 1968.

A critical evaluation of the Bereiter theories. Bibliography.

Classification

Huttenlocher, Janellen. "Children's Ability to Order and Orient Objects." Child Development 38:1169-76. December, 1967.

Describes experiments with four-year-olds to explore certain parallels in the children's ability to order and orient objects.

Iijima, Fusako. "The Understanding of the Logic of Classes and Number in the Child." Japanese Psychological Research 8:161-9. 1966. Abstract: PA41:16498.

An investigation of 4-6 year old children's understanding of the logic of classes and number. They could not understand the relation between classes and sub-classes.

Raven, Ronald J. "The Development of Classification Abilities in Culturally Disadvantaged Children." Journal of Research in Science Teaching 5(3):224-9. 1967/8.

Findings of this study support construction of a specialized curriculum for the teaching of classification abilities to children from low socio-economic backgrounds.

Dainton Report

"Dainton and the Schools: A School View I" by H. Frazer; "A School View II" by E. W. Maynard Potts. Trends in Education no. 11:24-37. July, 1968.

A summary of the recommendations of the Dainton Report on science education in Britain is followed by two articles appraising the report and its impact on British schools.

Dainton Report. London Times Educational Supplement 2754:692. March 1, 1968.

An analysis of the Dainton proposals and a listing of its recommendations.

Discovery Method

Braswell, A. L. "Science for First Grade." Science and Children 2:10-11. February, 1965.

States that content comes from all areas of science. Skills of observation and development of the use of the senses are stressed. Discovery is emphasized.

Hand, Jackson and Suzanne Szasz. "A Way to Teach Science for Every Teacher—For Every Grade." Grade Teacher 82:40-4. January, 1965.

A detailed discussion of the methodology of teaching by the discovery method.

Form Recognition

Denner, Bruce and Sheldon Cashdan. "Sensory Processing and the Recognition of Forms in Nursery School Children." British Journal of Psychology 58:101-4. May, 1967.

The finding of this study that young nursery school children are more likely to recognize a form if they manipulate it than if they merely inspect it visually is in general agreement with the literature.

Government in Education

Berson, Minnie Perrin. "Early Childhood Education." American Education 4:7-13. October, 1968.

A discussion of state and federal government role in early childhood education. Includes discussion of place of science in curriculum. Illus. Charts.

Intellectual Skills

Edwards, Thomas Francis, Ed.D. A Study in Teaching Selected Intellectual Skills to Kindergarten Children. Dissertation: Michigan State, 1966. DA 28.

Purpose of Study: (1) to construct lessons in science designed to teach selected skills; (2) to develop group non-reading tests which would measure the growth of the intellectual skills of observation, classification, data treatment and measurement.

Interdisciplinary Approach

George, Kenneth D. "Science for the Preschool Child." Science and Children 6:37-8. September, 1968.

Discusses methodology of discovery approach to science teaching. States that preschool science should be taught as an interrelated field and as an integrated part of child's school day.

Oklahoma City Schools. "Science-Language-Mathematics." Instructor 76:72-3. January, 1967.

Round-table discussion includes interdisciplinary programs for young children.

Kennedy Preschool Program

Block, Albert C., Ed.D. A Study of the Relative Effect of the John F. Kennedy Preschool Program on the First Grade Readiness and Achievement of Culturally Disadvantaged Children. Dissertation: University of Miami, 1968. DA 29-2: 399-A.

Analysis of Number Readiness variable shown to be significant in favor of Kennedy group. Study indicated positive relationship between length of preschool attendance and readiness for first grade.

Nurturance

Mandel, Susan Linda. Nurturance, Persistence and Distraction in Preschool Children. Dissertation: University of Cincinnati, 1968. DA 29:1845B.

Hypothesis I, that nurturance would lead to more persistence, was not supported; hypothesis II, that nurturance would lead to increased effectiveness, was partially supported.

Oxford Primary Science Project

"The Oxford Primary Science Project." Times Educational Supplement 2768:1921. June 7, 1968.

Describes the establishment and purposes of a research project at the Oxford University Institute of Education to inquire into the formation of scientific concepts in young children.

Note: In British education, the term "young children" refers to the age group 5-13, which group attends "primary" schools; the hierarchy being: Infant schools, Junior schools and Primary schools.

Plowden Report

"Plowden on Primary Schools." Times Educational Supplement 2695:97-100. January 13, 1967.

Includes a complete detailed listing of all of the proposals of this report, which concerns the reform of nursery and primary education in Britain.

Schiller, Christian. "The Plowden Report." New Era 48:53-5. April, 1967.

An editorial appraising the recommendations of the Plowden Report on primary education in Britain.

Probability Judgements

Goldberg, Susan. "Probability Judgements." Child Development 37:157-67. March, 1966.

Two samples made probability judgements under two conditions: Piaget procedure and decision-making procedure. Results analyzed.

Readiness

Newport, John F. "Can Experiences in Science Promote Reading Readiness?" Elementary School Journal 69:375-80. April, 1969.
States that experiences in science, in situations condusive to vocalizing, contribute toward making children language-ready for reading.

Science—Australia

Larat, M. "Teaching Primary School Science." The Australian Science Teachers' Journal 14:23-5. May, 1968.
Discusses methods proposed by the Victorian Primary School Science Committee.

Pustkuchen, P. "New Approach to Science in Western Australian Primary Schools." Australian Science Teachers' Journal 14:20-3. May, 1968.
Discusses the "Process Approach" as a means of teaching primary science.

Science— Handicapped

Hamilton, Alicita. "A Preschool Program for Children With Limited Hearing." Young Children 21:267-71. May, 1966.
Discusses the Acoupedic Method of "auditory bombardment" for pre-school education of hard-of-hearing. Suggests activities.

Volta Review 70: September, 1968 (published by the Alexander Graham Bell Assoc. for the Deaf).
A special issue devoted to "Curriculum: Content and Cognition: Curriculum for the Deaf." Organized by curriculum area.
See BIBLIOGRAPHY for contents of curriculum areas Natural Science and Mathematics.

Science—Pakistan

Tanveer, Sardar Ahmad, Ed.D. An Evaluation of the Science Curriculum for Primary Schools in Pakistan. Dissertation: Indiana University, 1964. DA 25: 4483A.
The scope and sequence of primary science was evaluated on the basis of developed criteria. One conclusion: primary science is structured ahead of time but not enough opportunity is provided for flexibility.

Science—USSR

Nizova, A. M. "Natural History in the Primary Grades." Soviet Education 7:23-7. August, 1965.

Outlines proposed natural science curriculum for G1, 2, 3. Emphasizes "those methods which are peculiar to the sciences of nature" being used during the study of nature.

Shatkin, L. N. "Tasks and Content of Primary Education." Soviet Education 7: 30-5. January, 1965.

"Teach the child to seek the answers to his questions in books and in science." Recommends greater amount of "scientific and geographic" knowledge be presented.

Sex Education

Christensen, Nancy B. and Eleanor B. Schlaretski. "Incubation and Sex Education." Science and Children 6:9-10. April, 1969.

Discusses a classroom incubation experiment to teach the concept that all living things come from other living things and eventually die.

Levine, Milton I., M.D. "Early Sex Education." Young Children 22:11-15, October, 1966.

Sex education should begin very early and be dealt with knowledgeably. Suggests activities for understanding of reproduction.

Skills

Lombard, Avima Dushkin. Effectiveness of Instruction in Puzzle Assembly Skills With Preschool Children. Dissertation: UCLA, 1968. DA 29-6:1783-A.

Results indicated that both instruction and practice treatments produced significant gains in puzzle-assembly skill.

Study and Teaching

Conard, David and Herbert D. Thier. "The Life Sciences: A Short Course for Teachers." Instructor 78:63-8. January, 1969.

Discusses growth and development, metabolism, reproduction, responsiveness, community, adaptation, change. A concise treatment, geared to those with little science background.

Transfer of Learning

Cayce, Charles Thomas. Transfer of Learning Sets Across Sense Modalities in Preschool Children. Dissertation: University of Mississippi, 1968. DA 29: 1494B.

Conclusion: prior training in one sense modality did not affect learning-set formation in a second sense modality.

Mumbauer, Corinne C. and Richard D. Odum. "Variables Affecting the Performance of Preschool Children in Intradimensional, Reversal and Extradimensional Shifts." Journal of Experimental Psychology 75:180-7. 1967. Abstract: PA41:06499.

'44 preschool children were presented a transfer-of-discrimination task in which the variables were overt verbalizing, overtraining, dimension and shift. Dimension was found to interact with each of the other variables in determining transfer performance.

TV Instruction

Mukerji, Rose. "'Roundabout' — Television for Disadvantaged Young Children." Contemporary Education 40:172-4. January, 1969.

Includes discussion of science and math offerings of this project developed by the Greater Washington Educational Television Association.

Welliver, Paul W. "Exploring the World of Science." Science and Children 6:39-41. October, 1968.

Discusses the use of instructional TV to promote scientific knowledge, awareness and behavior among primary grade children.

B. Activities

Bartlett, Margaret Farrington. "Magnets in the Kindergarten." Grade Teacher 81:28+. June, 1964.

Lists activities which teach the properties of magnets.

Bennett, Esther Holt. "Developing an Aquarium." Instructor 76:113. January, 1967.

Describes activities centered around an aquarium.

Bennett, Lloyd M. and others. "Gravity." Science and Children 6:26-7. October, 1968.

Describes 3 experiments to illustrate various properties of gravity.

Blough, Glenn O. "Firsthand Science Experiences." Instructor 78:64-5. December, 1968.

"In themselves, firsthand experiences do not necessarily make a good science program. What's really important is what use teachers help children make of them." Suggests activities for primaries.

Brown, Virginia and Billie Phillips. "Early Education Guide." Grade Teacher 86:38-42. April, 1969.

Includes preschool and kindergarten activities for science and number readiness.

Note: "Early Education Guide" is a regular monthly feature of Grade Teacher.

deWire, Margaret. "Seeing and Feeling Science." Instructor 78:39. November, 1968.

Have children bring acorns, etc., to school and discuss them.

Donohue, Joan Katherine. "A Tale of Toys." Science and Children 6:22. January/February, 1969.

A pupil dramatization culminates a six-week G1 unit on toys involving experiences with five forces related to air, muscles, electricity, gravity and magnetism.

Feigenbaum, Kenneth. "Activities to Teach the Concept of Conservation." Young Children 24:151-4. January, 1969.

Describes activities using musical chairs, dolls and carriages and play-dough.

Fitzmaurice, Robert W. "Finding Fruits in the Fall." Science and Children 6:20-1. September, 1968.

Discusses concepts and activities centered around outdoor observation of fall fruit. Includes supplemental activities in art, social studies, math and language arts.

Furgason, Dorothy. "Outdoor Science for Primary Children." Instructor 78:54. April, 1969.

Includes seven tested activities.

Lansdown, Brenda and Lisa Perhouse. "Insect Interest Transforms a Neighborhood." Science and Children 5:12-13. April, 1968.

Describes a four-week summer animal study project for children of low socio-economic backgrounds.

LaSalle, Donald P. and Amy S. Dewey. "Candle-making with the Primaries." Science and Children 4:28-9. October, 1966.

Describes a candle-making activity as a natural way of introducing young children to some of the many changes which matter can undergo.

Lipson, Joseph I. "An Individualized Science Laboratory." Science and Children 4:8-12. December, 1966.

Describes a plan for creating individualized science lab lessons for K-3 non-readers.

McCombs, Freda Siler, Ed.D. The Design of Selected Science Experiences for Grades Kindergarten Through Three. Dissertation: University of North Carolina at Chapel Hill, 1963. DA 25:6315A.

Procedures consisted of reviewing the literature related to the topic, identifying learning factors in problem solving and concept development, identifying science concepts appropriate for primary grades, and designing sample experiences.

Riesenfeld, Ilse. "Science for the Year." Instructor 76:30-1. November, 1966.
An outline of calendar-oriented Kindergarten science activities from October-June.

Riley, Carole. "Carpentry in the Nursery School." Young Children 20:25-7. October, 1964.
Includes materials list, safety rules, activities, bibliography.

Subarsky, Zachariah. "First Grade Chemistry." Science and Children 4:5-7. December, 1966.
Describes a lesson which is part of a unit on "Investigating Systems."

Swartz, Myrtle Evelyn, Ed.D. A Study of the Relationship Between Theory and Practice for Selected Kindergarten Activities. Dissertation: University of Kansas, 1964. DA 26:913.
Nine Froebel-devised activities were used. A comparison made between theoretical justifications given by Kindergarten educators and the purposes given by Kindergarten teachers revealed discrepancies between theory and practice for five of the activities.

Weisheit, Marilyn. "Knowing Is Experiencing." Childhood Education 44:498-500. April, 1968.
Describes baby chicks hatching from their eggs in a K classroom.

C. Concepts

Boener, Charlotte M. "Evaluation of the Grade Placement of Science Concepts in the Early Elementary Grades." Journal of Research in Science Teaching 5(3):253-60. 1967/8.
Nonverbal evaluation techniques can be used to assist in the grade placement of science concepts at the primary grade level.

_____. "Picture Test for Comprehension of Science Concepts." School Science and Mathematics 66:409-14. May, 1966.
Evidence indicates that it is possible to create an objective, teacher-administrated, non-reading, group science mastery test. Illustrated.

Bourne, H. N. "The Concept of Area." Arithmetic Teacher 15:233-43. May, 1968.
Describes practical experiences to help primary children form concepts of area.

Brace, Alec and Dayal Nelson. "The Preschool Child's Concept of Numbers." Arithmetic Teacher 12:126-33. February, 1965.
Purpose of study: to assess number knowledge of preschool children and to determine which factors influence the early growth of number ideas. Biblio.

Brakken, Earl. "To Develop Science Concepts." Instructor 78:98-9. November, 1968.

Discusses conceptualizing in science. Suggests activities.

Concannon, Josephina, Sister. "Concept Development in Kindergarten." Catholic Educational Review 66:516-22. November, 1968.

Discusses K plans centering on the child's cognitive functions. Gives extensive list of exercises designed to develop concept formation.

Freeman, Valdora Y. "Relational Concepts." Instructor 77:28+. April, 1968.

Survey showed that children need a working knowledge of relational terms if they are to respond correctly to directions and materials of all kinds.

Fromberg, Doris Cronin. The Reactions of Kindergarten Children to Intellectual Challenge. Dissertation: Columbia, 1965. DA 26:904.

Focus of this study is upon children who were exposed to science experiences that were meant to concretize aspects of the concept of the interaction of forces in the physical world.

Hendricks, Robert E. "Concept Development in Science." Education 87:195-8. December, 1966.

Includes discussion of abilities and goals for young children. Biblio.

Lepper, Robert Earl. A Cross Cultural Investigation of the Relationships Between the Development of Selected Science-Related Concepts and Social Status and Reading Readiness of Negro and White First Graders. Dissertation: Florida State, 1965. DA 26:4501.

Piagetian tests used in this study are tasks of conservation of continuous substance, discontinuous substance, number, length and area. Only significant difference found between the three levels of social status was on the task of conservation of continuous substance.

Also in Journal of Research in Science Teaching 5(4):324.

Mitler, Merrill M. and Lauren Harris. "Dimension Preference and Performance on a Series of Concept Identification Tasks in Kindergarten, First-Grade and Third Grade Children." Journal of Experimental Child Psychology 7:374-84. April, 1969.

Data are presented relating to children's preferences for stimulous dimension (form, color and number) to performance on concept identification tasks involving preferred and non-preferred dimensions.

Nickelson, Alden. "Mushrooms." Science and Children 6:10-12. September, 1968.

Includes discussion of concepts of grouping and diversity of living things which can be grouped by K and G-1.

Olmsted, Cameron Bea, Ed.D. An Inventory of Information Beginning First Grade Children Have Concerning Certain Concepts Selected from First Grade Science Textbooks. Dissertation: Colorado State College, 1963. DA 25:197A.

Data were secured by personal interviews with 140 beginning first grade children. Responses to the interview questions were recorded by check-marks or brief sentences on checksheets prepared for each child.

Raven, Ronald J. "The Development of the Concept of Momentum in Primary School Children." Journal of Research in Science Teaching 5(3)216-24. 1967/8.

Evidence favoring the conceptual sequence: "momentum → conservation of matter→ proportional use of mass and velocity→velocity" is presented. Bibliography. See DA 26:3762.

Raven, Ronald Jacob, Ph.D. An Investigation into the Development of the Concept of Momentum in Primary School Children. Dissertation: UC, 1965. DA 26:3762.

Results agreed with Piaget's findings on the development of the conservation of matter, speed and the proportion schema.

Renwick, E. M. "Science and Child—Reminiscences Largely Autographical." New Era 47:158-60. September/October, 1966.

A series of anecdotes dealing with young children and their emerging scientific concepts.

Rossi, Ernest L. and Sheila I. Rossi. "Concept Utilization, Serial Order and Recall in Nursery School Children." Child Development 36:771-8. September, 1965.

Discusses a study to determine whether a process of stimulus reorganization or simple rote memory was more basic for learning in young children. Biblio.

Rush, Orville Findley, Jr. The Development of Scientific Concepts of Living and Nonliving Among Preschool Children. Dissertation: University of North Carolina, 1964. DA 26:1486.

One conclusion: the preschool child is capable of organizing facts into principles, principles into generalizations, and generalizations into coherent concepts.

Sharefkin, Belle D. "What's a Balloon?" Science and Children 6:18-19. April, 1969.

Student teachers interview a sample of K-2 children to gather data on early levels of perception and scientific reasoning.

Stephens, Lois and Wilbur H. Dutton. "The Development of Time Concepts by Kindergarten Children." School Science and Mathematics 44:59-63. January, 1969.

Describes a study to determine the capacity of children of Kindergarten age of varying abilities to develop mathematical concepts related to telling time.

Wickens, Elaine. "Teaching About Life and Death." Science and Children 4:23-4. October, 1966.

Describes how experiences with classroom animals can teach primary-level concepts relating to life and death.

D. Conservation*

Davol, Stephen H. and others. "Conservation of Continuous Quantity Investigated as a Scalable Developmental Concept." Merrill-Palmer Quarterly 13:191. 1967.

In line with Piaget's analysis of concrete operations the results of a test of 30 K-G3 children suggested a shift in orientation toward the problems occurring during G1 and G2.

Griffiths, Judith A. and others. "A Methodological Problem in Conservation Studies: The Use of Relational Terms." Child Development 38:841-8. 1967.

Deals with the ability of preschool children to use the relational terms "more", "same" and "less" when comparing the number, length and weight of objects.

Harper, E. Harold and others. "An Evaluation of Teaching Conservation of Numerousness." School Science and Mathematics 44:287-96. April, 1969.

Describes a study designed to test the hypothesis that selected experiences would enhance the ability of K children to conserve numerousness. Extensive (38-entry) bibliography.

Steffe, Leslie P. "The Relationship of Conservation of Numerousness to Problem-Solving Abilities of First Grade Children." Arithmetic Teacher 15:47-52. January, 1968.

Describes and evaluates a test of conservation of numerousness administered to 341 children at the end of the first grade. Bibliography.

Winer, Gerald A. "Induced Set and Acquisition of Number Conservation." Child Development 39:195-205. March, 1968.

Purpose of the study: to investigate whether certain sets, experimentally induced, could determine responses to conflict trials and to tests of conservation.

E. Curriculum

Brown, H. Jess. "A Concept Prerequisite and Development Test for the First Grade." Journal of Research in Science Teaching 5(1):30-1. 1968.

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*Those interested in Conservation should also check Piaget heading.

Describes the development of an evaluative instrument to be used by curriculum researchers to measure and compare attainment of the goals of K-3 science curriculums.

Gorton, Harry B. and Richard L. Robinson. "For Better Results—A Full Day Kindergarten." Education 89:217-21. February/March, 1969.

Includes a discussion of the role of the science curriculum in the full-day schedule.

Gotkin, Lassar G. "A Calendar Curriculum for Disadvantaged Children." Teachers College Record 68:406-17. February, 1967.

"The need to teach concepts related to the regularities of time is fairly obvious—less obvious, however, is the need for specialized approaches which involve presenting these concepts to the lower class child in meaningful ways." Suggests activities.

Grossman, Bruce. "The Academic Grind at Age Three." Education Digest 34:26-8. March, 1969.

"A premature emphasis on the teaching of traditional academic skills at the pre-school level is inconsistent with the necessity to foster each child's creative potential."

Karnes, Merle B. and others. "An Evaluation of Two Preschool Programs for Disadvantaged Children: A Traditional and a Highly Structured Preschool." Exceptional Children 34:667-76. May, 1968.

The experimental program proved to be significantly more effective in promoting intellectual functioning, language abilities, perceptual development and school readiness.

Kittrell, Flemmie P. "Enriching the Preschool Experience of Children From Age 3." I. The Program. II. The Evaluation (by Jean C. Fuschillo). Children 15:135-43. July, 1968.

Describes a two-year preschool program for disadvantaged children. Children in program experienced average IQ rise of 14.6 points over the two-year period compared to an average gain of 4.0 points in the control group.

Krockover, Gerald H. and Lynn W. Glass. "Adding Process to Your Science Unit." School Science and Mathematics 44:297-9. April, 1969.

Includes the processes in the AAAs program for the primary grades. Bibliography.

Lawson, Chester A. "The Life Science Program of the Science Curriculum Improvement Study." American Biology Teacher 29:185-90. March, 1967.

Describes the designing of a program, based on the reactions to the proposed materials of a group of first graders.

Lockard, J. David. "Elementary Science Curriculum Projects." Instructor 77:52-3. January, 1968.
A comparative chart including projects for Kindergarten.

"National Elementary Science Curriculum Projects." Childhood Education 44:374-5. February, 1968.
A chart listing ten projects. Information includes project title and director, address, purpose and grade level, present accomplishments, project evaluation, future plans, commercial affiliations, materials for purchase and free materials.

Reidford, Philip and Michael Berzonsky. "Field Test of an Academically Oriented Program." Elementary School Journal 69:271-6. February, 1969.
Describes a test of the Bereiter-Engelmann program in a Head Start setting. Results indicated that long-term exposure to B-E curriculum raised IQ's and stimulated development in reasoning ability. Bibliography.

"Science Symposium." Instructor 78:69-71. January, 1969.
Includes earth-space concepts for primary level and a suggested approach to sequential science learning.

Subarsky, Zachariah. "Curriculum Construction for K-6 Science and Math—A Strategy." Science and Children 6:15-17. November, 1968.
The bulk of this article is concerned with curricular development at the K-Primary level.

Widmer, E. L. "In Kindergarten." Elementary School Journal 67:185-91. January, 1967.
Includes a discussion of the science curriculum's emphasis on care, observation and function, rather than on structure.

Weber, Lois. "The Curriculum in Grade I." Education 83:567-9. May, 1963.
Includes guidelines for the development of a science curriculum.

F. Discrimination

Blank, Marion and others. "Crossmodal Transfer of Form Discrimination in Preschool Children." Psychonomic Science 10:51-2. 1968. Abstract: PA 42:6497.
Forty 3-4-year-old children were given cross-modal transfer problems involving presentation of identical form discriminations in the visual and tactual modalities. Transfer, without relevant verbalization, was obtained from vision to touch, but not from touch to vision.

Clark, Ann D. and Charlotte J. Richards. "Auditory Discrimination Among Economically Disadvantaged and Nondisadvantaged Preschool Children." Exceptional Children 33:259-62. December, 1966.

Results of this study indicated a significant deficiency in auditory discrimination among the economically disadvantaged group.

Corah, Norman L. "The Influence of Some Stimulus Characteristics on Color and Form Perception in Nursery School Children." Child Development 37:205-11. 1966. Abstract: PA 40:5226.

Identical tests were given to groups of nursery school and 7-9-year-old children. The preschoolers gave more color responses under all conditions than did the 7-9 group.

_____ and James B. Cross. "Hue, Brightness and Saturation Variables in Color-Form Matching." Child Development 38:137-42. 1967. Abstract: PA 41:8674.

Differences in hue had no significant effect on color matching at K level, while differences in brightness produced the greatest number of color matches.

James, Barbara E., Ph.D. Tactile Discrimination in Young Children. Dissertation: Florida State, 1965. DA 26:4797.

Purpose: to develop a test designed to measure tactile discrimination in young children and to examine it in relation to age and sex. One result: the only observed significant difference between boys and girls was found in the age range of 6:2-6:8, the girls obtaining higher scores at this age than the boys.

Reese, Hayne W. "Discrimination Learning Set and Perceptual Set in Young Children." Child Development 36:153-61. 1965. Abstract: PA 39:11994.

A test of preschool children showed that young children exhibit a deficiency in mediation under some conditions (perceptual set) but not others (learning set). Bibliography.

Schermann, Ada. "The Relation of Shape and Colour Preference to Shape and Colour Discrimination in Young Children." Child Study 29:2-11. 1967. Abstract: PA 41:15046.

Four-year-old nursery children were used to study the relation between discrimination and preference. Differences were significant in the relational discrimination scores for high and low preferrers.

G. Goals

Heffernan, Helen. "What Is Good Education in Nursery School and Kindergarten?" Childhood Education 41:25-8. September, 1964.

Includes a discussion of science- and math-oriented goals.

Kappel, Anne H. "The Chicken or the Egg." Young Children 20:363-7. March, 1966.

Discussion of values and goals of preschool education includes introduction of scientific concepts.

Margolin, Edythe. "Work and Play—Are They Really Opposites?" Elementary School Journal 67:343-53. April, 1967.

Includes a section on science teaching which discusses the experimental approach and the shift in emphasis from product to process.

Moffitt, Mary W. "Science for Young Children." New Era 45:68-76. March, 1964.

"The science program for young children should deal with concepts that are consistent with their intellectual development. The emphasis should be on phenomena that may be observed and manipulated." A thoughtful and perceptive treatment of the subject.

Perryman, Lucile C. "Science and the Young Child." Young Children 20:47-51. October, 1964.

A thorough treatment of goals for science education for young children.

Senn, Milton J. E., M.D. "Early Childhood Education: For What Goals?" Children 16:7-13. January/February, 1969.

A scholarly general discussion of educational goals for young children. Discusses Piaget, Montessori and Headstart. Bibliography.

H. Headstart

Bradley, Helen P. "Science: The World Opens for Head Start Children." Science and Children 5:31-2. November, 1967.

Discusses the value of a science program for deprived young children. States that variety and balance, coupled with flexibility, are key values for well thought-out science curriculum for young child.

Cauman, Judith. "Head Start Activities From the OEO." Instructor 76:150. February, 1967.

Discusses activities related to measurement concepts.

Hodes, Marion R., Ed.D. A Comparison of Selected Educational Characteristics of Culturally Disadvantaged Kindergarten Children Who Attended Project Headstart (Summer Program 1965), Culturally Disadvantaged Children Who Did Not Attend Project Headstart, and Kindergarten Children Who Were Not Culturally Disadvantaged. Dissertation: University of Pennsylvania, 1967. DA 29-1:62-A.

Achievement assessed and compared for the three groups on five variables: articulation, auditory discrimination, visual discrimination, recognition vocabulary and conceptual maturity.

Law, Norma R. "Equipment: Challenge or Stereotype?" Young Children 20: 18-24. October, 1964.

Discussion of the relative merits of various types of equipment and materials.

Muse, Vernon Clyde, Ed.D. An Assessment of "Headstart" Training on Intelligence and Achievement of a Selected Group of First Grade Students. Dissertation: Mississippi State University, 1968. DA 29-6:1724 A.

No statistically significant differences shown between test and control groups.

Omwake, Eveline. "Has Headstart Made a Difference?" Childhood Education 42:479-86. April, 1966.

An evaluation in which teacher comments support the effectiveness of the program. K and G1 teachers report that younger siblings of pre-Headstart children, who have attended Headstart schools, show improved behavior and readiness compared to their older brothers and sisters.

Orton, Richard E. "Head Start .. We're Past the Trial Run." Instructor 76:24-5. December, 1966.

An extensive listing of materials for specific Headstart activities.

Porter, Jean Tansey. An Evaluation of the Head Start Program in Calhoun County, Michigan, Summer, 1965, With Particular Attention to School Readiness. Dissertation: Michigan State, 1967. DA 29:418A.

No significant differences in performance or gains between the samples on readiness tests or teacher ratings. Kindergarten teachers noted more improvement than indicated on tests.

Sugerman, Jule M. "The Headstart Teacher." Instructor 77:27-32. June/July, 1968.

Includes guidelines for developing science and math concepts.

I. Materials

Gross, Dorothy Weisman. "Equipping a Classroom for Young Children." Young Children 24:100-3. December, 1968.

"If we aim at encouraging a child to discover for himself his own and the world's boundaries and possibilities, the physical structure of a school must be of a kind which will aid self-knowledge and independent inquiry."

"How to Equip and Supply Your Prekindergarten Classroom." Nation's Schools 77:66-7+. June, 1966.

A comprehensive listing of materials, arranged by such subject areas as Science (22 items), Building Blocks, Wheel Toys.

Note: This article is one of a group of several articles in this issue under the heading, Special Report: How Preprimary Programs Work (pp. 48-68+).

Ring, Art. "Preserving and Displaying Plant and Animal Specimens." Instructor 76:117. January, 1967.

Covers materials needed, procedure and what to collect.

Shipley, Sara. "Food Choppers Belong in Kindergarten." Instructor 78:39, October, 1968.
Discusses kindergarten activities with food choppers.

Thier, Herbert. "A Look at a First Grader's Understanding of Matter." Journal of Research in Science Teaching 3(1):84-9. 1965.
This study attempts to evaluate the success of curriculum materials through personal interviews similar to those employed by Piaget.

Ward, Evangeline. "The Young Years .. A Walk into Space." Instructor 75:37. September, 1965.
Process of preschool "education with purpose" involves a variety of materials to provide "ventures into the unknown." Should seek awareness of "the beginning of things."

J. Montessori

Elkind, David. "Piaget and Montessori." Harvard Educational Review 37:535-45. 1967. Abstract: PA 42:4715.
Montessori and Piaget should be accepted on their own terms and their ideas not forced into current conceptual frameworks.

Light, Mildred J. "Montessori for Today." Education 87:484-7. April, 1967.
Discusses adaptation of Montessori methods to current situations. Includes suggested activities for sense development. Biblio.

Mills, William H. and Garry L. McDaniels. "Montessori—Yesterday and Today." Young Children 21:137-41. January, 1966.
Discusses incorporation of her ideas in modern practice without following the strict, orthodox methodology.

Pitcher, Evelyn G. "An Evaluation of the Montessori Method in Schools for Young Children." Childhood Education 42:489-92. April, 1966.
This concise evaluation includes a discussion of the Bereiter plan.

Selman, Ruth Corey and Elsie M. Selman. "Montessori." Instructor 77:20-2. January, 1968.
Two articles—one favoring and one critical of Montessori methods. Includes examination of approach to experimentation and investigation.

Wilcott, Paul. "The Initial American Reception of the Montessori Method." School Review 76:147-65. June, 1968.
This article includes over four pages of "notes" which comprise an excellent bibliography of the literature of the Montessori Method.

GPO 814-452-4

K. Perception

Corah, Norman L. "The Influence of Some Stimulus Characteristics on Color and Form Perception in Nursery School Children." Child Development 37:205-11. March, 1966.

Hypothesis was confirmed that amount of color and complexity of certain stimuli would be related to level of color response.

Kholmovskaya, V. V. "The Perception of Proportions in Preschool Children." Voprosy Psikhologii 4:33-43. 1965. Abstract: PA 39:14650.

Results of testing showed that beginning with age 5, preschool children are able to perceive proportions of figures as a special property of figures.

Linn, Shirley H. A. "A Follow-up: Achievement Report of First-Grade Students after Visual-Perceptual Training in Kindergarten." Academic Therapy Quarterly 3:179-80. 1968. Abstract: PA 42:12811.

Reports a follow-up study of achievement in G-1 after training with the Frostic Program for Development of Visual Perception in Kindergarten.

Smith, Ralph A. "The 3 Modes of Perception." Instructor 78:57-64. April, 1969.

Includes discussion of development of scientific perception. Suggests activities for Kindergarten and Primary.

L. Piaget

Benson, Francis Arthur Mitchell, Ed.D. An Examination over an Eight Month Period of Piaget's Concept of Number Development and the Presence or Absence of Certain Interrelated Tasks in a Group of First Grade Children. Dissertation: Oregon University, 1966. DA 27:3300-A.

A longitudinal study examining the question: "Does the ability to carry out operations of class and seriation as they relate to number concepts develop according to a pattern which could be described as synchronous or sequential?"

Bentler, P. M. "The Dimensions and Measurement of Conservation." Child Development 39:787-802. September, 1968.

Behavior and explanation conservation items given to sample of 143 K, G1 and G2 children. Two scales constructed from these items. Scales cross-validated on new sample. Significant correlations with school grades and other variables found.

Chittenden, Edward Augustus, Ph.D. The Development of Certain Logical Abilities and the Child's Concepts of Substance and Weight: An Examination of Piaget's Theory. Dissertation: Columbia, 1964. DA 25:3096A.

It was noted that the demarkation between size and weight in the last years of the preoperational period and those in the early years of concrete operations was clear, and corresponds with Piaget's accounts.

Elkind, David. "Piaget and Montessori." Harvard Educational Review 37:535-45. 1967. Abstract: PA 42:4715.

Piaget and Montessori should be accepted on their own terms and their ideas not forced into current conceptual frameworks.

Etuk, Elizabeth Eme Samson, Ed.D. The Development of Number Concepts: An Examination of Piaget's Theory with Yoruba-Speaking Nigerian Children. Dissertation: Columbia, 1967. DA 28:1295-A.

Subjects were pupils of seven Nigerian primary schools. Results generally upheld Piaget's theory.

Journal of Research in Science Teaching. 2(3). 1964.

Special issue devoted to the topic: "Piaget Rediscovered: Selected Papers from a Report of the Conference on Cognitive Studies and Curriculum Development, March, 1964."

Kamii, Constance E. and Norma L. Radin. "A Framework for a Preschool Curriculum Based on Some Piagetian Concepts." Journal of Creative Behavior 1: 314-24. 1967. Abstract: PA 42:4504.

A conceptual framework for a preschool curriculum is indicated, that is particularly geared to the needs of disadvantaged children leading to the development of logical thinking and creativity.

Kohlberg, Laurence. "Early Education: A Cognitive-Developmental View." Child Development 39:1013-62. December, 1968.

Reviews the implications of the cognitive-developmental theories of Baldwin, Dewey, Piaget and Vygotsky for preschool children. Thesis: cognitive-developmental components of preschool play and other activities should be systematically formulated.

Kooistra, William Henry, Ph.D. Developmental Trends in the Attainment of Conservation, Transitivity, and Relativitism in the Thinking of Children: A Replication and Extension of Piaget's Ontogenetic Formulations. Dissertation: Wayne State University, 1963. DA 25:2032.

Eleven procedural tasks were given to 96 children from 4 age levels: 4, 5, 6 and 7. Responses consisted of a judgement and an explanation of the reasoning which led to that judgement. Results are discussed in terms of their relevance to previous experimental findings and theoretical formulations of Piaget and other investigators.

Lee, Charlotte, Ph.D. The Concomitant Development of Cognitive and Moral Modes of Thought. Dissertation: Ohio State University, 1968. DA 29:1836B.

Findings support Piaget's hypothesis of sequential stages in both cognitive and moral judgement; also, his thesis of concomitant growth of the two modes of thought.

Lepper, Robert E. "A Cross-Cultural Investigation of the Development of Selected Piagetian Science Concepts, Social Status and Reading Readiness." Journal of Research in Science Teaching 5(4):324-37. 1967/8.

This study of Negro and white first graders reveals that the development of Piagetian conservation concepts reflects differences in cultural background rather than in race.

O'Brien, Thomas C. and Bernard S. Shapiro. "Problem Solving and the Development of Cognitive Structure." Arithmetic Teacher 16:11-15. January, 1969.

A scholarly discussion of Piaget's theory of cognitive development.

Palmer, Edward L. "Accelerating the Child's Cognitive Attainments Through the Inducement of Cognitive Conflict: An Interpretation of the Piagetian Position." Journal of Research in Science Teaching 3(4):318-25. 1965.

Discusses the possibility of accelerating a child's development through instruction which places the child in situations which produce a resolvable cognitive conflict.

Picard, Anthony J. "Piaget's Theory of Development with Implications for Teaching Elementary School Mathematics." School Science and Mathematics 44:275-80. April, 1969.

"If acceleration of development is possible, we can profitably expose the child to more mathematics than is presently incorporated in the elementary school program." Bibliography.

Randall, David Leon, Ph.D. Examination of the Hereditary Assumptions Underlying Piaget's Theory of the Development of Intellectual Structure. Dissertation: University of Colorado, 1967. DA 29-1:378B.

Idea of conservation of matter (referring to concept of sameness) was chosen for acceleration through training. Results showed changes in performance for transitional children but no significant changes for nonconserving children.

Roos, Anne Duncan, Ed.D. A Content Analysis of Published and Original Verse Suitable for Primary Grade Science. Dissertation: Temple University, 1967. DA 28:4831-A.

Poems and verses from five selected anthologies plus 17 original verses were analyzed.

Sonquist, Hanne D. "Applying Some Piagetian Concepts in the Classroom for the Disadvantaged." Young Children 22:231-8+. March, 1967.

Discusses the development of the child's intelligence using a step-by-step approach which facilitated the transition from sensory-motor to conceptual intelligence. Bibliography.

Thomas, Patricia Grafton and Robert R. Buell. "Piagetian Studies in Science: Perception and Rendering of Form by Children." Journal of Research in Science Teaching 5(1):36. 1968.

Purpose of the study: to determine whether a relationship exists between developmental age and the ability to internalize and reproduce three-dimensional forms in two dimensions.

M. Problem Solving

Anderson, Richard C. "Can First-Graders Learn an Advanced Problem-Solving Skill?" Journal of Educational Psychology 56:283-94. 1965. Abstract: PA 40:3351.
Results of a training procedure indicate that children can acquire, retain and transfer rather complex and "advanced" problem-solving skills when presented with suitable training.

Grossman, Rose. "Problem-Solving Activities Observed in British Primary Schools." Arithmetic Teacher 16:34-8. January, 1969.
Discusses observations made during a visit to British schools involved in teaching innovative primary school mathematics programs.

Levin, Gerald R. and Deborah R. Hamermesh. "Procedure and Instructions in Kindergarteners' Matching-to-Sample." Psychonomic Science 8:429-30. 1967.
An observing response procedure and instructions designed to induce a problem-solving set were studied in 48 Kindergarteners presented with matching sample-to-sample problems. The antecedent variables were found to facilitate performance.

Price, Louis E. and Charles C. Spiker. "Effect of Similarity of Irrelevant Stimuli on Performance in Discrimination Learning Problems." Journal of Experimental Child Psychology 5:324-31. 1967. Abstract: PA 41:15060.
The stimulus interaction predicts that increasing the similarity of a pair of irrelevant stimuli will facilitate learning in the simultaneous discrimination problem and increase the difficulty of the successive problem.

Riedesel, C. Alan. "Problem Solving—Some Suggestions for Research." Arithmetic Teacher 16:54-8. January, 1969.
Includes an extensive listing (c80 entries) of "Selected Research References" in problem solving.

II. MATHEMATICS

Ashlock, Robert B. "Planning Mathematics Instruction for Four- and Five-Year-Olds." Arithmetic Teacher 13:397-400. May, 1966.
Identifies and discusses the basic concepts to be developed at this level and selection of appropriate activities. Bibliography.

_____. "A Test of Understandings for the Primary Grades." Arithmetic Teacher 15:438-41. May, 1968.

Purpose of study: to develop a test of understandings of selected properties of number systems suitable for use with G1 and 2. Bibliography.

_____. "What Math for Fours and Fives?" Childhood Education 43:469-73. April, 1967.

A description of some of the mathematical understandings which may be developed with young children.

_____ and Ronald C. Welch. "A Test of Understandings of Selected Properties of a Number System." Bulletin of the School of Education Indiana University 42:1-74. 1966. Abstract: PA 40:9220.

A test of pupil understanding of basic properties of a number system was developed and administered to G1 and G2 children. It was found to have a high degree of reliability and validity, as well as suitability for the primary grades.

Beard, Virginia. "Mathematics in Kindergarten." Education 85:439-41. March, 1965.

Suggests interesting, practical and effective ways of presenting a mathematics program to children of kindergarten age.

Bottcher, H. F. "A Training Procedure for the Development of Number Concepts in the Preschool Age." Probleme und Ergebnisse der Psychologie 19:7-43. 1966. Abstract: PA 41:6277.

Reports a series of studies in which 50 Kindergarten children were given systematic tutoring in number concepts in the preschool age.

Brace, Alec and Dayal Nelson. "The Preschool Child's Concept of Numbers." Arithmetic Teacher 12:126-33. February, 1965.

Purpose of study: to assess number knowledge of preschool children and to determine which factors influence the early growth of number ideas. Bibliography.

Braine, Lila Ghent. "Age Changes in the Mode of Perceiving Geometric Forms." Psychonomic Science 2:155-6. 1965. Abstract: PA 39:9819.

Provides evidence that the order in which parts of a form are scanned changes in the preschool period.

Bravo, Ann R. "Formal Preparation for Early Childhood Arithmetic." Arithmetic Teacher 12:56-8. January, 1965.

Discusses the need for formal planning of young children's math experiences.

Castanada, Alberta M. "A Mathematics Program for Disadvantaged Mexican American First-Grade Children." Arithmetic Teacher 15:413-19. May, 1968.
Presents the rationale for and the content of a mathematics program written for and taught to a group of Mexican-American disadvantaged first-graders. Bibliography.

Deal, Therry N. and Jeannine P. Maness. "New Horizons in Kindermath." Young Children 23:354-7. September, 1968.
Study reveals that nursery and Kindergarten teachers have been giving math concepts to children but may not have been aware of what they were doing.

Drachenberg, Cecil, Ed.D. Nongraded materials and Programming of Modern Mathematics for the Primary School with Modern Mathematics for the Primary School, A Nongraded Mathematics Program for Grades K-3. Dissertation: University of Houston, 1964. DA 28:3358-A.
One recommendation: provision should be made for adequate pre-service and in-service training for teachers.

"Early Education Guide." Grade Teacher 86:144-7. February, 1969.
Includes preschool and kindergarten activities in science and number readiness.
Note: "Early Education Guide" is a regular monthly feature in Grade Teacher.

Gurau, Peter K. "A Deck of Cards, a Bunch of Kids and Thou." Arithmetic Teacher 16:115-17. February, 1969.
"The following series of card games is offerred almost as a curriculum in beginning mathematics. It presupposes only that the youngsters have all learned to recite the counting numbers up through ten."

Heard, Ida Mae. "Developing Geometric Concepts in the Kindergarten." Arithmetic Teacher 16:229-30. March, 1969.
Describes activities to teach shape discrimination and properties of shapes.

_____. "Making and Using Graphs in the Kindergarten Mathematics Program." Arithmetic Teacher 15:504-6+. October, 1968.
Describes activities with block-, bar- and picture-graphs.

_____. "Number Games with Young Children." Young Children 24:147-51. January, 1969.
Describes games with finger puppets, listening for coins in a box and spinner games.

Heimgartner, Norman Louis, Ed.D. Selected Mathematical Abilities of Beginning Kindergarten Children. Dissertation: Colorado State College, 1968. DA 29:406A.

Some conclusions: Kindergarten children have ability to rote count far beyond ten; K males and females did equally well on six of the eight subtests.

Hollis, Loye Yvorne, Ed.D. A Study to Compare the Effects of Teaching First Grade Mathematics by the Cuisenaire-Gattegne Method with the Traditional Method. Dissertation: Texas Tech, 1964. DA 26:904.

One conclusion: pupils taught by the C-G method acquire mathematical concepts and skills that were not taught in the traditional program.

Humphrey, James A. "An Exploratory Study of Active Games in Learning of Number Concepts by First Grade Boys and Girls." Perceptual and Motor Skills 23(2): 341-2. 1966. Abstract: PA 41:826.

Using the difference between pre- and post-test scores as criteria, the results suggest that all the children learned the required skills.

Ikeda, Hitoshi and Masue Ando. "Introduction to the Numeration of Two-Place Numbers." Arithmetic Teacher 16:249-51. April, 1969.

Describes three lessons: The Use of Records, Making a Record of Groups of Things and Developing an Understanding of Two-Place Numerals.

Josephina, Sister, C.S.J. "Quantitative Thinking of Preschool Children." Arithmetic Teacher 12:54-5. January, 1965.

Results of this study indicate that the preschool child possesses quantitative ability to a degree which needs the attention of curriculum makers and teachers.

Lehew, Charmon. "The Performance of Four- and Five-Year-Old Children in Operation Head Start on Selected Arithmetic Abilities." Arithmetic Teacher 15:53-9. January, 1968.

Purpose of study: to determine the understanding of specific number concepts of preschool children and to attempt to determine mathematical areas that need emphasis in the Head Start Curriculum.

McClintic, Joan. "The Kindergarten Child Measures Up." Arithmetic Teacher 15:26-9. January, 1968.

Describes children's use of materials during problem solving in the area of measurement.

Menchinshaia, N. A. and M. I. Moro. "On the Reorganization of Mathematics Education in the Primary School." Soviet Education 6:17-26. April, 1964.

"It is now the specialists in the respective fields of science who have undertaken to revise the content of school education and are taking a direct part in compiling new curriculums."

Nesbit, Mary Y. and others. "Mathematics Activities to Implement." Instructor 78:87-93. February, 1969.
Features tasks and activities on three levels (Level I: age 5-7). Bibliography.

Oberlin, Lynn and Mary Jean Oberlin. "Mathematics for Four-Year-Olds." Arithmetic Teacher 15:10-12. January, 1968.
Describes experiences which help to develop basic math understandings, such as set matching and measurement.

Paschal, Billy J. "Mathematical Readiness." Journal of Negro Education 36:78-80. Winter, 1967.
Discusses the role of mathematical readiness activities in preschool programs for disadvantaged children.

Picard, Anthony J. "Piaget's Theory of Development with Implications for Teaching Elementary School Mathematics." School Science and Mathematics 64:275-80. April, 1969.
A scholarly, detailed illustrated review of Piaget's theory of the development of knowledge. Bibliography.

Schlinsog, George W. "More About Mathematics in the Kindergarten." Arithmetic Teacher 15:701-5. December, 1968.
Discusses the role of mathematics in kindergarten as a prerequisite to perceiving, discussing and reasoning about the quantitative aspects of life.

Shipley, Sara S. "Cooking Teacher Numbers in Kindergarten." Grade Teacher 82:71+. November, 1964.
Describes applesauce-making and egg-cooking as activities for building number skills in kindergarten.

Spencer, James Edward. Intertask Interference in Primary Arithmetic. Dissertation: UC, 1967. DA 28:2570-A.
Findings of study tend to support occurrence of some intertask interference and some facilitation. Facilitation occurred more frequently than interference.

Sueltz, Ben A. "The Mathematics of a Five-Year-Old Girl." Arithmetic Teacher 12:221-3. March, 1965.
Report based on personal observation of a girl by her father for a period of three weeks at the time of the child's fifth birthday.

Swartz, Evelyn. "Interrelationships Between Mathematics and Art for the Kindergarten." Arithmetic Teacher 15:420-1. May, 1968.
Discusses activities correlated to the fact that both math and art are concerned with the objective of helping children develop visual perception skills so they can recognize and identify shapes, sizes and colors.

GPO 814-452-3

Wheatley, Grayson H., Jr., Ed.D. Conservation, Counting and Cardination as Factors in Mathematics Achievement among First Grade Students. Dissertation: University of Delaware, 1967. DA 29:1481-A.

Piaget-type number concept test given to sample of entering G1 children. Some conclusions: conservation of number seems to be more highly related to achievement than counting or cardination; wide variance of understanding of Piaget-type number concepts.

Williams, Alfred H. "Mathematics Concepts, Skills and Abilities for Kindergarten Entrants." Arithmetic Teacher 12:261-8. April, 1965.

One purpose of study: to discover some of the home influences affecting math achievement at Kindergarten level.

Williams, Alfred Horace, Ed.D. Mathematical Skills, Concepts and Abilities of Kindergarten Entrants. Dissertation: USC, 1964. DA 25:3333.

One finding: children respond more successfully to items concerning measurement, number, geometry and logic than to other mathematical strands.

Woods, Ruth L. "Preschool Arithmetic Is Important." Arithmetic Teacher 15:7-9. January, 1968.

Discusses the preschool development of the concept of various relationships, such as "more than," "less than," "the same as" and one to one.

III. BIBLIOGRAPHY

Audiovisual Instruction 14. February, 1969.

Special issue devoted to "Mathematics Through Media."

Contemporary Education 40(3). January, 1969.

A special issue devoted to early childhood education.

Children 16(2). March/April, 1969.

Features a special section: "Children Under Three—Finding Ways to Stimulate Development."

Davidson, Patricia S. "An Annotated Bibliography of Suggested Manipulative Devices." Arithmetic Teacher 15:509-24. October, 1968.

Organized into 15 general categories, prices are quoted, items are graded and list of suppliers with addresses is included.

Hendrickson, Norejane and Bruce M. Williams. "Audio-visual Materials in Early Childhood Education." Young Children 24:209-17. March, 1969.

Features "A Beginner's Basic List of Audio-Visual Resources in Early Childhood Education." Includes addresses of distributors.

Journal of Research in Science Teaching 2(3). 1964.
Special issue devoted to the topic: "Piaget Rediscovered: Selected Papers from a Report of the Conference on Cognitive Studies and Curriculum Development, March, 1964."

Labow, Arlene. "Selected References on Preschool, Parental and Kindergarten-Primary Education." Elementary School Journal 65:338-49. March, 1965.
A general annotated listing of periodical and pamphlet references covering the period 1963-4 and including many science-oriented entries.

Riedesel, C. Alan. "Problem Solving—Some Suggestions for Research." Arithmetic Teacher 16:54-8. January, 1969.
Includes an extensive listing (c80 entries) of "Selected Research References" in problem solving.

"Selected Readings on Elementary Science Experimental Projects." National Elementary Principal 45:36-40. April, 1966.
An extensive annotated bibliography of pamphlet and periodical references. Excerpted from: Wailes, James R., Bibliography on Elementary School Science Experimental Projects; a comprehensive annotated bibliography available for 25¢ from the Bureau of Educational Research, University of Colorado, Boulder, Colorado 80304. 22p.

Volta Review 70. September, 1968. (Published by the Alexander Graham Bell Assoc. for the Deaf.)
A special issue devoted to "Curriculum: Content and Cognition: Curriculum for the Deaf." Organized by curriculum area. Partial contents: pp. 279-99, Natural Science: Hedges, "Natural Science for All Students"; Fitzgerald, "Trends in Science Education"; Owstey, "Development of Cognitive Abilities and Language of Deaf Children Through Science"; DeWalt, "Adaptations of the Scientific Method for the Deaf Child." pp. 419-40, Mathematics: Woodby and Wirtz, "Curriculum in School Mathematics"; O'Neill, "Developing Deaf Children's Thinking Through Mathematics"; Summers and Swain, "Valuable Characteristics of Modern Mathematics Instruction for Deaf Students."

Wilcott, Paul. "The Initial American Reception of the Montessori Method." School Review 76:147-65. June, 1968.
This article includes over four pages of "notes" which comprise an excellent bibliography of the literature on the Montessori Method.

Wong, Herbert. "Selecting Science Books for the Library." Instructor 76:80-5. November, 1966.
Lists eight criteria for book selection and includes bibliography of review sources.

GPO 814-452-2